

ABSTRACT

A capacitor uses niobium pentoxide in the manufacture of a semiconductor device. The niobium pentoxide has a low crystallization temperature of 600°C that provides control
5 over the oxidation of the bottom electrode during heat-treatment. A dielectric constituent present as an amorphous oxide along the grain boundaries of polycrystalline niobium pentoxide is used for a capacitor insulator, thereby providing a method to decrease the
10 leakage current along the grain boundary of niobium pentoxide and to realize a high dielectric constant and low-temperature crystallization.